PLASMA IMMERSION ION IMPLANTATION APPARATUS INCLUDING A CAPACITIVELY COUPLED PLASMA SOURCE HAVING LOW DISSOCIATION AND LOW MINIMUM PLASMA VOLTAGE

ABSTRACT

A plasma immersion ion implantation reactor for implanting a species into a workpiece includes an enclosure which has a side wall and a ceiling defining a chamber, and a workpiece support pedestal within the chamber for supporting a workpiece having a surface layer into which the species are to be ion implanted, the workpiece support pedestal facing an interior surface of the ceiling so as to define therebetween a process region extending generally across the diameter of the wafer support pedestal. The reactor further includes an RF plasma source power generator connected across the ceiling or the sidewall and the workpiece support pedestal for capacitively coupling RF source power into the chamber. A gas distribution apparatus is provided for furnishing process gas into the chamber and a supply of process gas is provided for furnishing to the gas distribution devices a process gas containing the species. An RF bias generator is connected to the workpiece support pedestal and has an RF bias frequency for establishing an RF bias.